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(54) Sighting system for backing a
towing vehicle onto a trailer

(57) The driver of the towing vehicle 7 looks into a mirror 9 and steers in reverse so as to align mark 10 on mirror 9 with the centre of pattern 6 in the rear window and with marked portion 12 on vertical member 3 which hangs directly above socket 2 on the trailer 1. This causes ball 4 fixed at the rear end of the towing vehicle to move in a direction to bring it under socket 2 on the trailer. The driver receives an indication that he has reversed far enough by noting when a distinctly marked length 12 on vertical member 3 appears to fill a defined portion of the pattern 6 on the rear window of the towing vehicle. In alternative embodiments, the driver does not use the rear-view mirror 10, or two rear-view mirrors may be used.

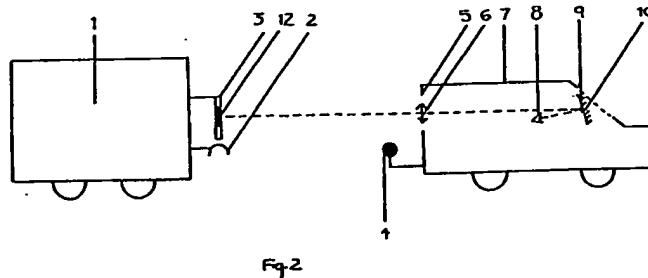


Fig 2

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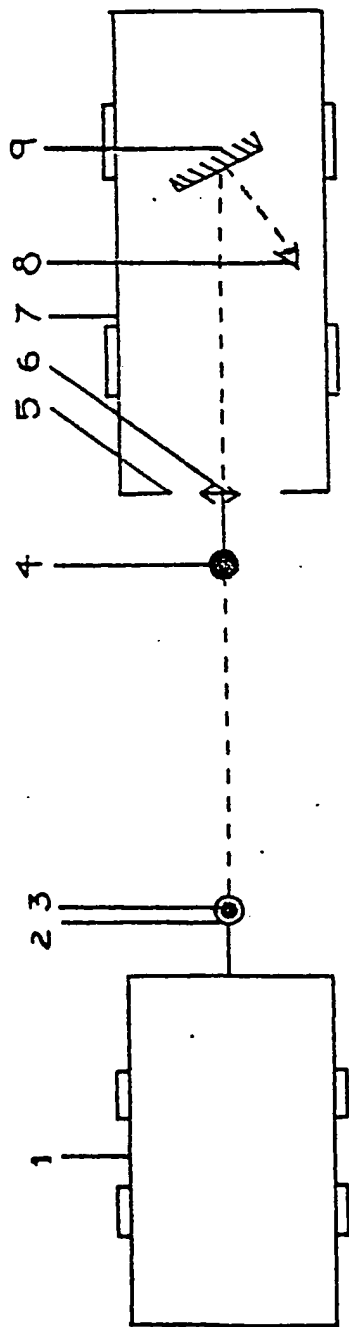


Fig. 1

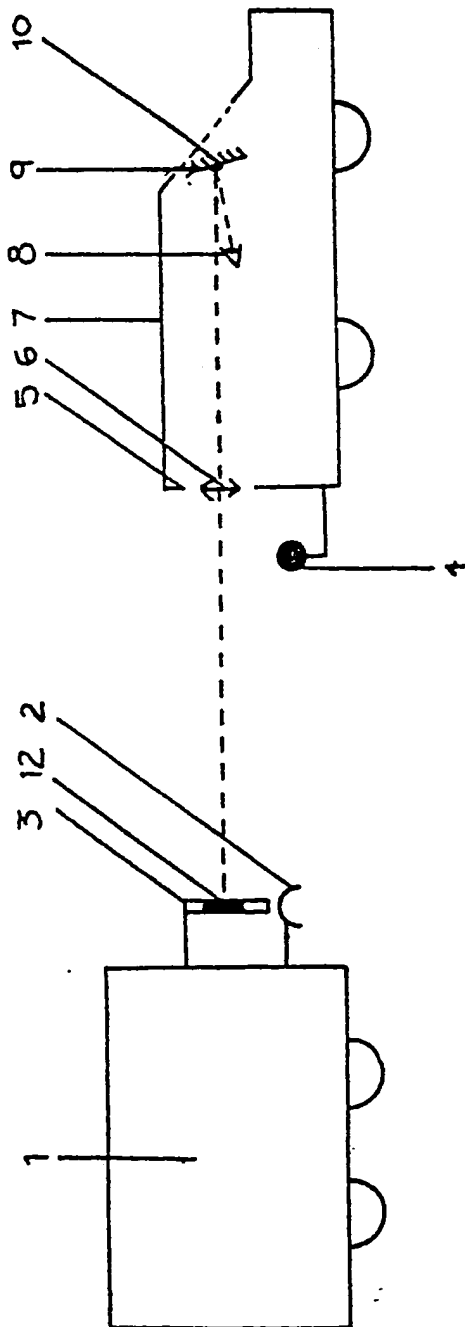


Fig. 2

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2/7

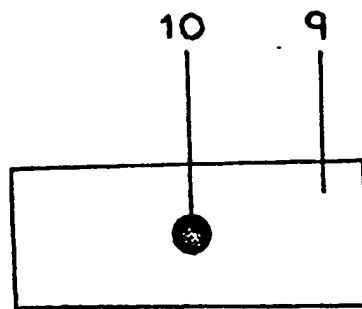


Fig. 3

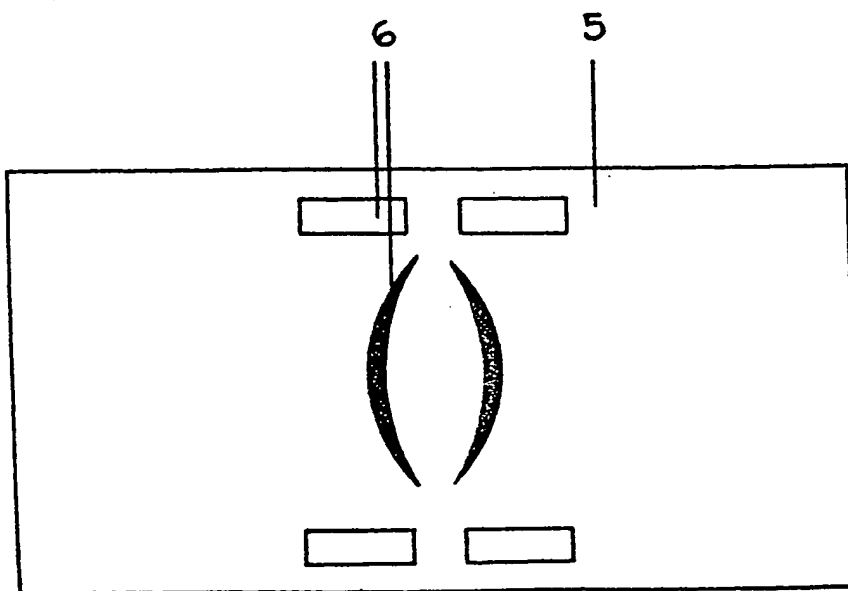


Fig. 4

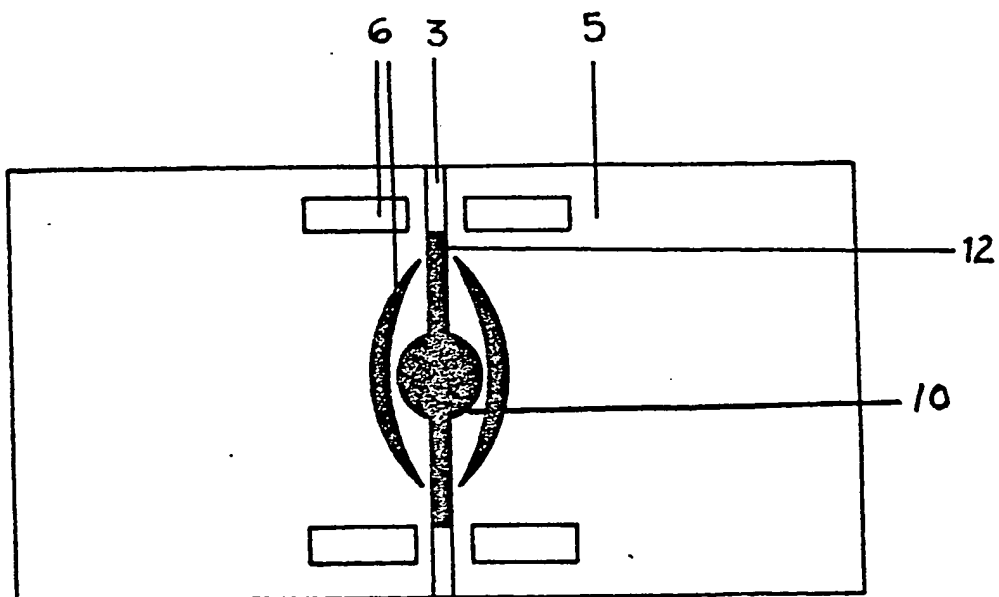


Fig. 5

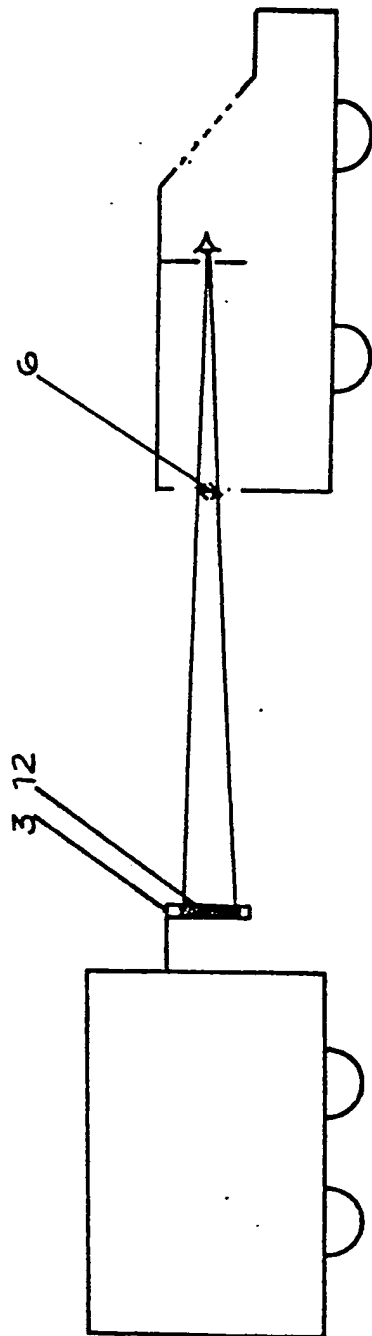


Fig. 6

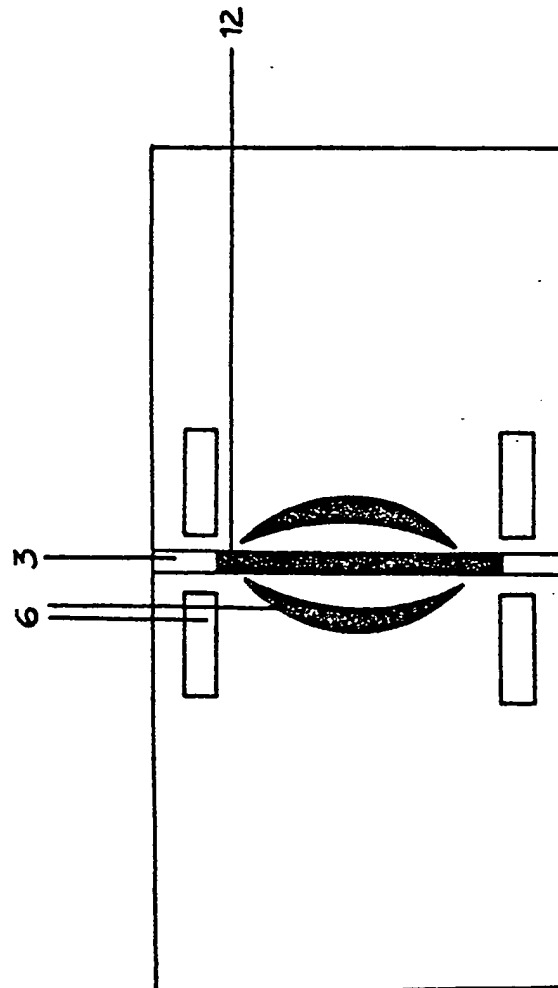
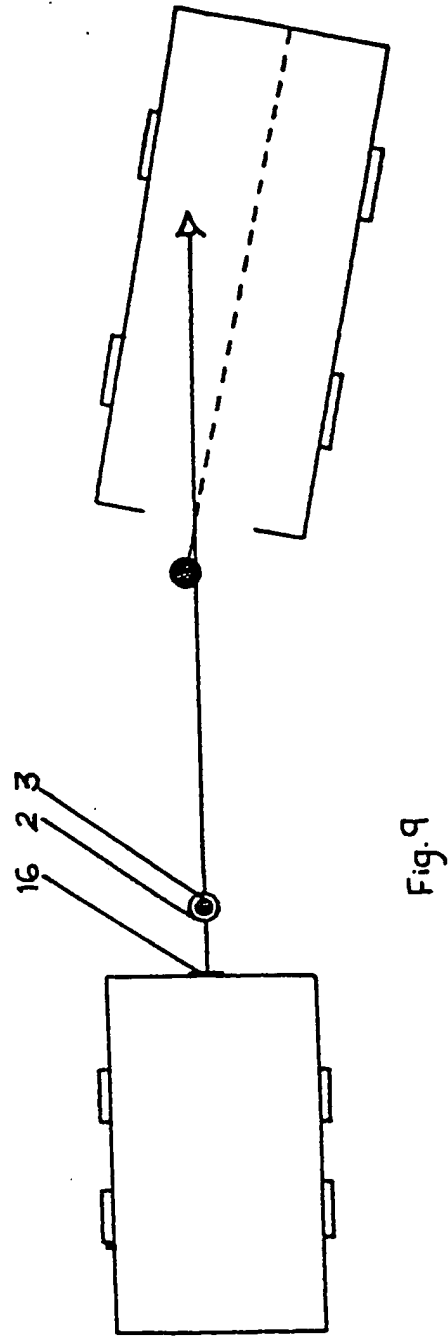
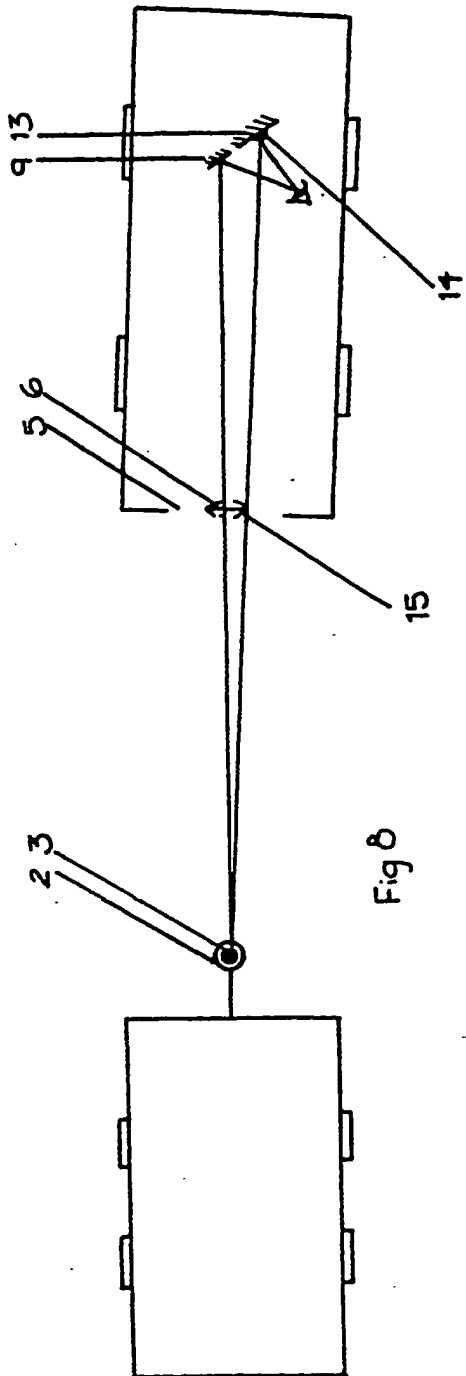


Fig. 7



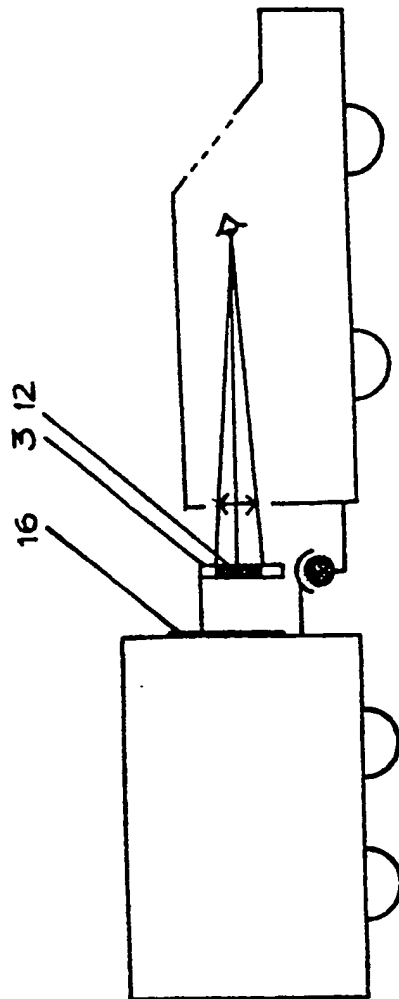


Fig. 10

Fig. 11

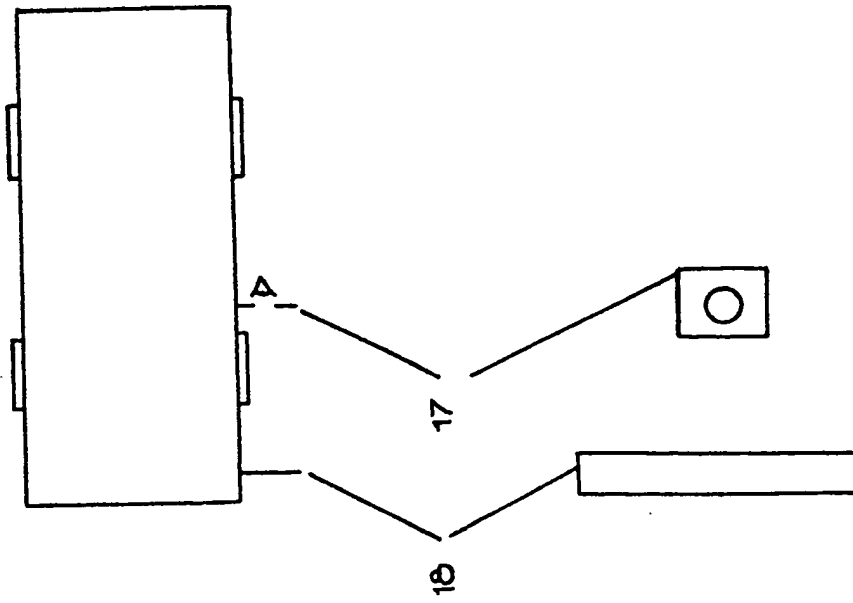
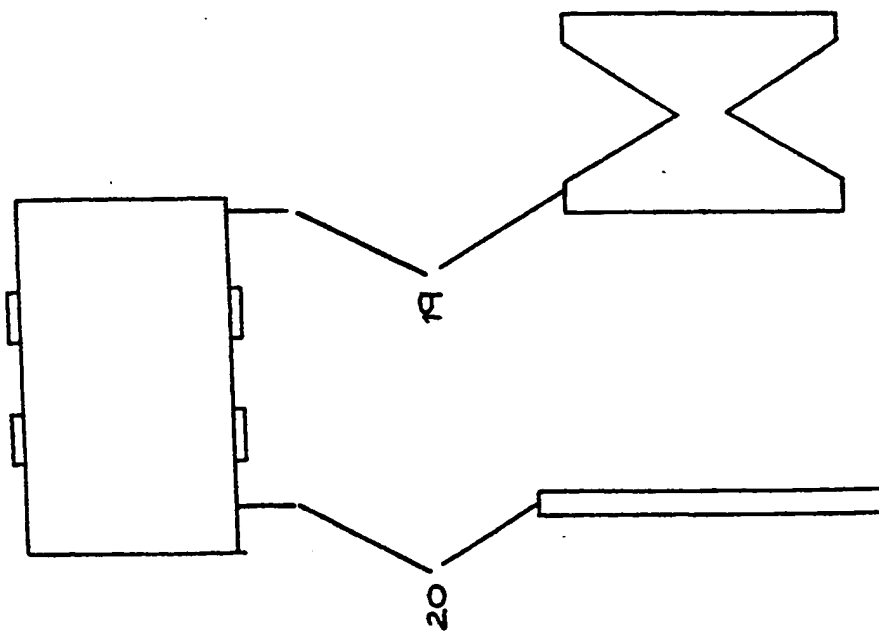


Fig. 12



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7/7

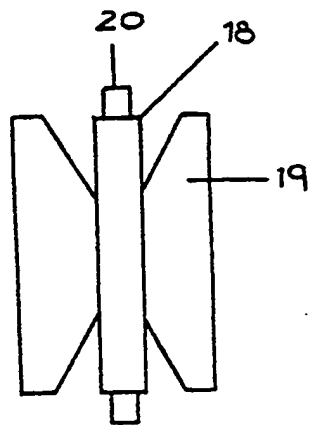


Fig. 13

SPECIFICATION

Sighting system for backing a towing vehicle onto a trailer

5 The present invention relates to a system whereby a towing vehicle may be positioned in such a way as to make connection with a trailer to be towed. Typically, this method is concerned with towing vehicles which have a tow-connector mounted on the longitudinal axis thereof which co-operates with a complementary connector on the longitudinal axis of a wheeled trailer.

10 The first of two problems to be solved is to ensure that the towing vehicle moves accurately in the required direction towards the trailer, and the second is that it shall stop in the required position to allow connection of the respective connectors. This invention also provides a system for backing the trailer in a straight line after it has been connected to the towing vehicle.

In accordance with the present invention, there is provided a sighting system for directing a towing vehicle having a towing attachment mounted thereon on to a trailer, comprising a first sighting means and second sighting means, the first and second sighting means being provided on the towing vehicle and the trailer respectively such that when viewed in alignment from the driving position of the towing vehicle, the towing vehicle having the towing attachment may be directed towards an attachment point on the trailer to allow inter-engagement thereof.

15 In a preferred embodiment, said sighting means are arranged such that when viewed from the driving position of the towing vehicle, an indication of the distance between the towing vehicle and the trailer may be obtained.

20 Preferably said first sighting means comprises a front sight and a back sight, and said second sighting means comprises a target.

25 It is also preferred that a first sight is provided on a rearward facing mirror mounted in the towing vehicle and forms a back sight, and a second sight is provided on a rear window of the towing vehicle through which said mirror reflects and forms a front sight.

30 In an alternative preferred embodiment, a first sight is mounted behind the driving position on the towing vehicle such that a driver must turn backwards to view the sights and target together.

35 Conveniently, the target comprises an elongate rod which hangs vertically from an arm mounted on the trailer. Preferably, the target is mounted on an arm which is pivotally mounted on the trailer.

40 In a further embodiment, a second target is mounted on the trailer and the first sight, second sight, target and second target are all brought into alignment when the towing vehicle is directly ahead of the trailer.

45 A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawings in which:

50 *Figure 1* shows a plan view of the towing vehicle and trailer;

Figure 2 shows a side view of the towing vehicle and trailer;

Figure 3 shows the interior mirror of the towing vehicle;

70 *Figure 4* shows the rear window of the towing vehicle with a pattern marked on it;

Figure 5 shows what the driver sees in the mirror when he has brought the towing vehicle into the required position;

75 *Figure 6* shows a side view of towing vehicle and trailer using a different sighting system;

Figure 7 shows what the driver sees in the rear window when using the sighting system illustrated in *Figure 6*.

80 *Figure 8*. Plan view of a system utilizing two mirrors;

Figure 9. Plan view of a method in which the driver looks directly through the rear window.

85 *Figure 10*. Side view of arrangement shown in *Figure 9*, after completion of coupling.

Figure 11. Plan view of method in which markers are placed on the off sides of the two vehicles.

90 *Figure 12*. The markers of *Figure 11* and the view of them seen by the driver when the towing vehicle has been brought into the correct position.

Referring to the drawings, *Figure 1* and *Figure 2* show the towing vehicle at a short distance in front of a trailer 1 but not necessarily in line with it. From the rear end of the towing vehicle there protrudes a fixed ball 4 for engagement with socket 2 fixed low down in front of the trailer. Inside the towing vehicle there is a central interior mirror 9 viewed by one eye 8 of the driver. *Figure 3* shows this mirror and its centre dot 10 acting as a back-sight. The centre of dot 10 lies in the vertical longitudinal plane bisecting the towing vehicle. In order that the centre of dot 10 may always lie in this median plane ideally the mirror should be pivoted about axes passing through dot 10. However sufficient accuracy may be obtained by use of a normal interior driving mirror which is normally pivoted by a ball and socket joint located a short distance behind the mirror. If the usual type of rear surface mirror is used a reflection of dot 10 on the front surface will be seen and should be ignored. This reflection may be avoided by use of a front surface mirror or by making dot 10 on the rear reflecting surface of the mirror.

100 The rear window 5 of the towing vehicle carries a pattern 6 which acts as a front sight and is shown in *Figure 4*.

105 A vertical member 3 which may conveniently be a round rod or tube of colour to contrast with that of the front face of the trailer hangs vertically down over the centre of socket 2. It acts as a target at which back sight dot 10 and front sight pattern 6 are to be aimed by the driver who looks into the mirror.

110 As an alternative to the vertical member 3, a horizontal member may be used, said horizontal member being marked so as to give an indication as to when the towing vehicle may be coupled to the trailer.

115 To orientate the towing vehicle so that ball 4 moves directly towards socket 2 the driver adjusts

mirror 9 to show the rear window in it. He then adjusts his head position until he sees dot 10 in the centre of pattern 6 in the rear window reflected in the mirror.

5 At this stage his line of sight is along the central axis of the towing vehicle. While maintaining this line of sight he steers the towing vehicle to bring target rod 3 into the centre of pattern 6 as shown in Figure 5. The central axis of the towing vehicle is now directed at target rod 12 with the result that ball 4 moves towards a point directly beneath target rod 3 and beneath socket 2.

The driver needs a signal to inform him when he has moved far enough to bring ball 4 into the required position beneath socket 2. On rod 3 on the trailer there is a portion 12 which is distinctively marked as shown in Figures 2, 5, 6 and 7. As the towing vehicle moves towards the trailer the driver sees marked portion 12 of rod 3 covering an increasingly large part of pattern 6 in his rear window. Portion 12 is made of a length such that when the ball comes to lie directly below the socket portion 12 will come to fill the whole of the space within pattern 6 as shown in Figures 5 and 6. This setting is to a small extent influenced by the distance of the driver's eye from the mirror, and if desired arrangements may be made to adjust the length of marked portion 12 to correspond to the driver's natural head position. Also any convenient means may be used to locate the driver's head position, though this measure is unlikely to be required.

In a variant of the system described above instead of using dot 10 on mirror 9 as the back sight the driver does not use the mirror at all. Instead he turns his head to look through the rear window directly as shown in Figure 6. Any convenient sighting device, for example a hole in a disc like the peep sight of a rifle may be used to bring the driver's eye onto the central axis of the towing vehicle. It may be suspended from the roof or attached to a wall of the towing vehicle in such a way that it may be folded away when not in use. Marked portion 12 will be made of a length to correspond with the eye position and the driver will set his vehicle to achieve the view shown in Figure 7.

In a second variant of the system the direction in which the towing vehicle moves is determined by use of dot 10 on mirror 9 and other markers as already described, but a different method is used for the determination of range and is illustrated in Figure 8. A second interior mirror 13 carrying a mark 14 is set at some distance towards the driver's side of the towing vehicle. The towing vehicle is backed until rod 3 on the trailer is seen to be in line with the lateral edge 15 of the pattern on the rear window and with the centre of mark 14 on mirror 13. Dimensions are such that this setting will bring the ball on the towing vehicle vertically beneath the socket on the trailer. This method is not influenced by the distance of the driver's eye from mirror 9 or mirror 13 but it is dependent upon an accurate orientation of the towing vehicle as already described for the method of determining direction.

Figures 9 and 10 show a variant of the method

of determining direction. A vertical stripe 16 is marked on the lower part of the midline of the front face of the trailer behind vertical rod 3. The driver reverses his towing vehicle and looking directly through the rear window without use of any mirror he steers so as to bring stripe 16 and rod 3 into line. He now makes any head movements necessary to maintain this alignment while he steers so as to bring the centre of pattern 6 in the rear window also into the same line of sight. As he maintains this alignment and continues to back his vehicle the central axes of the two vehicles will come to coincide and the setting for range is achieved by continuing the rearward movement of the towing vehicle until as before a mark of appropriate length on rod 3 fills the whole of the space within pattern 6 on the rear window.

Figures 11, 12 and 13 illustrate yet another variant of the same basic method. Two markers 17 and 18 on the towing vehicle and two markers 19 and 20 on the trailer are attached to the off-sides of the two vehicles as shown in Figures 11 and 12. The driver puts his head out of the off-side window and steers the towing vehicle in reverse to bring the four markers into line. The markers are so set that this alignment causes the axes of the two vehicles to coincide. The driver stops the towing vehicle at the point where marker 18 appears to cover precisely the full vertical extent of marker 19 as shown in Figure 13. The markers are made of sizes and placed in positions such that this setting ensures that the ball on the towing vehicle is placed vertically below the socket on the trailer. With experience of the head position required the driver may operate without the use of marker 17.

All the different variants of the method described may be adapted for use with coupling systems other than the ball and socket arrangement referred to in this specification.

In any of the systems already described which make use of a pattern on the rear window a wide variety of patterns may be employed. Similarly a wide variety of targets may be substituted for vertical member 3 shown in Figures 2, 6, 7 and 10. For example a horizontal member may be employed with a centre point marked on it and located vertically above socket 2. A distinctively marked length corresponding to portion 12 of rod 3 in Figure 2 will now be arranged to correspond to some feature of the pattern in the rear window having a lateral extent. To enable the towing vehicle to approach the trailer from various directions the horizontal member may be pivoted at its centre to allow rotation about a vertical axis. It can then be set by hand to lie perpendicular to the path along which the towing vehicle will approach the trailer.

The methods illustrated in Figures 9 and 11 provide guidance for backing the trailer in a straight line after it has been connected to the towing vehicle.

It will be clear that the present invention may be applied to any tow vehicle and trailer where it is not possible for the driver of the tow vehicle to observe the tow attachment points directly.

130

CLAIMS

1. A sighting system for directing a towing vehicle having a towing attachment mounted thereon
5 on to a trailer, comprising a first sighting means and second sighting means, the first and second sighting means being provided on the towing vehicle and the trailer respectively such that when
10 viewed in alignment from the driving position of the towing vehicle, the towing vehicle having the towing attachment may be directed towards an attachment point on the trailer to allow inter-engagement thereof.
2. A system as claimed in claim 1 wherein said
15 sighting means are arranged such that when viewed from the driving position of the towing vehicle, an indication of the distance between the towing vehicle and the trailer may be obtained.
3. A system as claimed in claim 1 or 2 wherein
20 said first sighting means comprises a front sight and a back sight, and said second sighting means comprises a target.
4. A system as claimed in claim 3 wherein a
25 first sight is provided on a rearward facing mirror mounted in the towing vehicle and forms a back sight, and a second sight is mounted on the towing vehicle behind the driver, such that said second sight may be seen in said mirror.
5. A system as claimed in claim 4 wherein said
30 second sight is mounted on a rear window of the towing vehicle through which said mirror reflects.
6. A system as claimed in claim 3 wherein a
first sight is mounted behind the driving position on the towing vehicle such that a driver must turn
35 backwards to view the sights and target together.
7. A system as claimed in any one of claims 3-6 wherein the target comprises an elongate rod which hangs vertically from an arm mounted on the trailer.
- 40 8. A system as claimed in any one of claims 3-6 wherein the target comprises a horizontal member.
9. A system as claimed in any one of claims 3-8 wherein the target is mounted on an arm which is pivotally mounted on the trailer.
- 45 10. A system as claimed in any preceding claim wherein a second target is mounted on the trailer and the first sight, second sight, target and second target are all brought into alignment when the towing vehicle is directly ahead of the trailer.

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